

REMARKS

By this amendment, Applicants have amended claim 8 to include therein limitations previously recited in claim 17 and to recite that the catalyst component produces fibers of an organic material by carbonation of the organic material. See, e.g., page 9, lines 7-9 of Applicants' specification. Applicants have canceled claim 17 and non-elected claims 1-7 and 11 without prejudice or disclaimer.

Since the foregoing amendments merely amend claim 8 to include therein a limitation already considered by the Examiner in connection claim 17 and clarify the function of the catalyst component, it is submitted the foregoing amendments do not raise new issues requiring further consideration and/or search. Moreover, the foregoing amendments place the application in condition for allowance for the reasons set forth hereinafter or, at least, in better form for consideration on appeal. Therefore, entry of this amendment under 37 CFR 1.116 is requested.

Claims 8-10, 12, 16, 19 and 20 stand rejected under 35 U.S.C. 102(b) as allegedly being anticipated by U.S. Patent No. 5,954,866 to Ohta et al. Claim 17 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Ohta et al. Applicants traverse these rejections and request reconsideration thereof.

The claimed invention relates to a coating solution for producing ceramic tubes. The solution includes at least one element selected from the group consisting of C, Ti, Zn, Sn, Al and a rare-earth element, a Cu compound, at least one metallic element selected from the group consisting of Fe, Co, Pt, Ru, Pd and La as a catalyst component to produce fibers of an organic material by carbonation of the organic material, and an organic material containing C, N and O bound to the at least one metallic element wherein the Cu compound is incorporated in the solution to have an elementary Cu/catalyst component ratio of 1 to 0.5. Applicants have found

that such a coating solution can be used to produce ceramic tubes by a simple production method.

The patent to Ohta et al. relates to ink for ink jet recording. The ink composition disclosed therein includes a pigment as a colorant, an anionic surfactant having a polyoxyethylene group, a dispersant, and water. Such an ink composition is disclosed to be used to record an image on a recording medium having a layer comprising a water-soluble resin by ink jet recording. In comparing the present invention to Ohta et al., the Examiner refers to a “coating solution” and mixes elements of the water-soluble resin layer on the recording medium with elements of the ink-composition. For example, the water-soluble resin disclosed at column 3, lines 10 and 11 of Ohta et al. to which the Examiner refers is present on the recording medium and not in the ink composition. On the other hand, the carbon black, the copper compound and the element comprising iron disclosed at column 4, lines 60-64 of Ohta et al. are in the ink composition not on the recording medium. Thus, the “coating solution” to which the Examiner refers in the second paragraph of numbered section 2 of the Office Action is not described in Ohta et al. The rejection must be withdrawn or at least restated (in a nonfinal office action) for this reason alone).

While the ink composition of Ohta et al. can include a polymer dispersant and an anionic surfactant, the Ohta et al. patent does not relate to a coating solution for producing ceramic tubes and does not disclose a solution including at least one element selected from the group consisting of C, Ti, Zn, Sn, Al and a rare earth element, a Cu compound, at least one metallic element selected from the group consisting of Fe, Co, Pt, Ru, Pd and La as a catalyst component, and an organic

material containing C, N, O bound to the at least one metallic element. Accordingly, the Ohta et al. patent does not disclose the presently claimed invention.

In view of the differences between Ohta et al. and the present invention, it is submitted it would not have been obvious to modify the teachings of Ohta et al. to arrive at the presently claimed invention.

More particularly, the present invention relates to a coating solution for producing ceramic tubes used for electronic devices, battery parts, catalysts and magnetic materials, etc. One conventional method for producing ceramic tubes by using a vacuum arc evaporation source has involved problems that a carbon nano-tube yield is low, it is very time-consuming, and its production cost is very high. The present invention provides a coating solution which can be used, e.g., to simply produce ceramic tubes by a pyrolysis process in a good yield.

In the production of ceramic tubes, a catalyst component and a hydrocarbon as a carbon component may be used. However, the pyrolysis process thermally treats a coating solution spread on a substrate, which tends to limit organic materials as the carbon source and makes it difficult to produce ceramic tubes. Such a process produces ceramic tubes in a low yield and an uneven film, because the organic material it uses evaporates when pyrolyzed, and the resulting gases not contacting with the catalyst are released out of the system without being treated, leaving part of the gases to be formed into carbon nano-tubes on the catalyst. Therefore, the coating solution of the present invention includes an organic/inorganic hybrid with a catalyst component bound to the organic material molecules as the carbon source. That is, the coating solution of the present invention has the feature that an organic material is bound to at least one metallic element selected from the group consisting of Fe, Co, Pt, Ru, Pd and La as the catalyst component. The

present inventors found for the first time that such a coating solution, when spread on a substrate and pyrolyzed, gives carbon nano-tubes in a high yield and a uniform film, because the catalyst component is uniformly dispersed and comes into contact with the carbon source.

In contrast, the Ohta et al. patent discloses an ink composition for an ink jet recording ink containing iron oxide, copper oxide, carbon black as a pigment component. The technical field of Ohta et al. is quite different from that of the present invention in that Ohta et al. is directed to an ink composition for an ink jet recording while the present invention is directed to a coating solution for producing ceramic tubes. Additionally, the purpose of Ohta et al. is also quite different from that of the present invention in that the purpose of Ohta et al. is provide an ink composition which can form a high quality image on a recording medium having a layer containing a water-soluble resin.

Moreover, the Ohta et al. patent does not disclose the technical concept of the present invention that ceramic tubes can be produced in a good yield by binding an organic material as a carbon source to a metallic element as a catalyst component in a coating solution for producing ceramic tubes. Thus, a person of ordinary skill in the art would not have been motivated to obtain the coating solution for producing ceramic tubes of the present invention in view of Ohta et al. which does not suggest at all that the ink composition can be used as a coating solution for producing ceramic tubes.

Additionally, the present invention has the feature that the elementary ratio of the Cu compound to the catalyst is 1 to 0.5 in terms of Cu/catalyst for an improvement of an yield of the resulting ceramic tube. The Ohta et al. patent neither discloses nor suggests an addition of an organic material by carbonation of the

organic material or any elementary ratio of the Cu compound to the catalyst in terms of Cu/catalyst.

The ink composition of Ohta et al. is used for an ink jet recording ink and an image is formed on a substrate by applying the ink composition to a layer containing an aqueous resin in Ohta. In contrast, the present invention relates to a coating solution for producing ceramic tubes. The present invention produces ceramic tubes by using the coating solution for producing ceramic tubes and by going through a coating step, a drying step, a pyrolysis step for producing fibers of a coating film, and an oxidation treatment step for producing hollow shapes of the fibrous product. The present invention has the feature that the elementary ratio of the Cu compound to the catalyst is 1 to 0.5 in terms of Cu/catalyst for conducting an efficient catalyst reaction in the production of the ceramic tubes and for an improvement of a yield of the resulting ceramic tubes.

The ink composition of Ohta et al. is different from the coating solution of the present invention in composition and object of use on that it does not generate a catalyst reaction, as mentioned above. For example, Ohta does not disclose any pyrolysis step or oxidation treatment step as in the present invention. Thus, a person of ordinary skill in the art would not have any reason to obtain a desired elementary ratio of Cu/catalyst for conducting an efficient catalyst reaction in the ink composition of Ohta requiring no catalyst reaction. Therefore, the present invention would not have been obvious over Ohta et al.

Claims 13, 14 and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Ohta et al. in view of U.S. Patent No. 4,487,747 to Robinson et al. Applicants traverse this rejection and request reconsideration thereof.

The Robinson et al. patent relates to the production of metal chlorides. Nothing in Robinson et al. remedies any of the basic deficiencies noted above with respect to Ohta et al. Therefore, claims 13, 14 and 18 are patentable over Ohta et al. and Robinson et al. at least for the reasons noted above.

Claim 15 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Ohta et al. in view of U.S. Patent No. 5,017,231 to Nishihara et al. Applicants traverse this rejection and request reconsideration thereof.

The Nishihara et al. patent discloses a heat-resistance pigment produced by forming a dense and uniform coating on the surface of the pigment by contacting the hydrophilic pigment with a metal oxide in at least partly water-miscible solvent. However, clearly nothing in Nishihara et al. remedies any of the basic deficiencies noted above with respect to Ohta et al. Accordingly, claim 15 is patentable over of the proposed combination of references at least for the reasons noted above.

In view of the foregoing amendments and remarks, entry of this amendment and favorable reconsideration and allowance of all of the claims now in the application are requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 500.43624X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

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